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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: **Ikuo TAKAHASHI et al.**

Group Art Unit: 1711

Serial Number: 10/698,934

Examiner: **Nathan M. Nutter**

Filed: **November 3, 2003**

Confirmation No.: 5043

For: **A BIODEGRADABLE PLASTIC COMPOSITION, A MOLDED ARTICLE THEREOF AND A METHOD FOR CONTROLLING BIODEGRADATION RATE USING THE SAME COMPOSITION**

Attorney Docket Number: 032044

Customer Number: 38834

SUBMISSION OF APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Date: November 1, 2005

Sir:

Applicants submit herewith an Appeal Brief in the above-identified U.S. patent application.

Attached please find a check in the amount of \$500.00 to cover the cost for the Appeal Brief.

If any additional fees are due in connection with this submission, please charge our Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

APPEAL BRIEF FOR THE APPELLANTS

Ex parte Ikuo TAKAHASHI et al. (Applicants)

**A BIODEGRADABLE PLASTIC COMPOSITION, A MOLDED ARTICLE THEREOF
AND A METHOD FOR CONTROLLING BIODEGRADATION RATE USING THE
SAME COMPOSITION**

Serial Number: **10/698,934**

Filed: **November 1, 2003**

Appeal No.:

Group Art Unit: **1711**

Examiner: **Nathan M. Nutter**

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Date: **November 1, 2005**

BRIEF ON APPEAL

(I) REAL PARTY IN INTEREST

The real party in interest is **NISSHINBO INDUSTRIES, INC.**, by an assignment recorded in the U. S. Patent and Trademark Office on **August 28, 2004** at Reel **015047**, Frame **0088**.

(II) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to appellant, appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(III) STATUS OF CLAIMS

Claims 1-10 are pending in the application and are appealed. The appealed claims appear in the Claims Appendix.

(IV) STATUS OF AMENDMENTS

No amendments have been filed subsequent to the close of prosecution.

(V) SUMMARY OF THE INVENTION

Claim 1 is directed to a biodegradable plastic composition comprising (A) 100 parts by weight of biodegradable plastic, (B) 0.01 to 10 parts by weight of a carbodiimide compound, and

(C) 0.01 to 10 parts by weight of at least one compound selected from the group consisting of benzotriazole-, triazine- and hydroxylamine-based compounds.

Claim 2 requires that in the biodegradable plastic composition, the benzotriazole-based compound is a benzotriazole-based ultraviolet absorber.

Claim 3 requires that in the biodegradable plastic composition, the triazine-based compound is a triazine-based ultraviolet absorber or triazine derivative having at least one amino group in the molecule.

Claim 4 requires that in the biodegradable plastic composition, the hydroxylamine-based compound is N-hydroxybenzotriazole or N-hydroxysuccinimide.

Claim 5 requires that in the biodegradable plastic composition, the biodegradable plastic (A) is an aliphatic-based polyester.

Claim 6 requires that in the biodegradable plastic composition, the carbodiimide compound (B) is aliphatic polycarbodiimide.

Claim 7 requires that in the biodegradable plastic composition, the aliphatic polycarbodiimide compound has an isocyanate terminal.

Claim 8 is directed to a molded article of a biodegradable plastic obtained by molding the biodegradable plastic composition according to any one of claims 1 to 7.

Claim 9 requires that the molded article of the biodegradable plastic is in the form of a molded article, an extrudate, a blow-molded article, a thermally molded article, a fiber, a non-woven fabric, a film or a sheet.

Claim 10 is directed to a method for controlling biodegradation rate of a biodegradable plastic, characterized in that a biodegradable plastic (A) is compounded with a carbodiimide compound (B) and at least one compound (C) selected from the group consisting of benzotriazole-, triazine- and hydroxylamine-based compounds in such a way to adjust its biodegradability.

(VI) ISSUE TO BE REVIEWED ON APPEAL

Whether claims 1-10 are unpatentable under 35 U.S.C. §103(a) over Fujihara in view of Hird, Gagliani, and Ohsawa.

(VII) ARGUMENT

Discussion of the cited art

Fujihara teaches a biodegradable resin material not having a benzotriazole-, triazine-, or hydroxylamine-based compound.

Hird teaches biodegradable articles made from trans-polymers, having Tinuvin 765 as an adjuvant which is an ultraviolet stabilizer.

Gagliani teaches a stabilized composition containing halopropynyl compounds, and discloses the use of benzotriazoles for the purpose of protection from color degradation as a result of light and/or heat.

Ohsawa teaches a one-pack coating composition, and discloses the use of triazine for the purpose of improving the storability of the coating composition.

Claims 1-10 are unpatentable under 35 U.S.C. §103(a) over Fujihara in view of Hird, Gagliani, and Ohsawa.

The Examiner argues that it would have been obvious to incorporate the ultraviolet stabilizers from any of Hird, Gagliani, or Ohsawa in the composition of Fujihara to stabilize the molded product against degradation by ultraviolet light, thereby imparting stability of color and mechanical properties. In the Office Action dated October 14, 2004, the Examiner used Hird et al. to illustrate the general concept of using an adjuvant which is an ultraviolet stabilizer. In response, applicants argued that Hird et al. does not disclose any of the specific members of the Markush group in claim 1. In the Office Action dated May 3, 2005, the Examiner stated:

Applicants' observation that "Hird does not disclose any member of the Markush groups of component (c) of instant claim 1" cannot be agreed with because Hird does mention Tinuvin 765 in col. 10, line 27, which according to the instant specification, page 22, is a benzotriazole based compound.

While it is true that Hird et al. discloses the use of Tinuvin 765, Tinuvin 765 is not actually mentioned in the specification. The specification at page 22 instead refers to Tinuvin 234, Tinuvin 320, Tinuvin 326, Tinuvin 327, Tinuvin 328, and Tinuvin P.

According to the *McGraw-Hill Dictionary of Scientific and Technical Terms*, benzotriazole has a structure of $C_6H_5N_3$ and hydroxylamine has a structure of NH_2OH . According to Dictionary.com, triazine is “any of three isomeric compounds, $C_3H_3N_3$, each having three carbon and three nitrogen atoms in a six-membered ring.” Please see the definitions of benzotriazole, hydroxylamine, and triazine in the Evidence Appendix.

Column 10 of Hird et al. clearly shows that Tinuvin 765, a hindered amine light stabilizer (HALS), corresponds to bis-(1,2,2,5,5-pentamethylpiperidinyl)sebacate. It is apparent to a person skilled in the art that this compound has a structure in which 1,2,2,5,5-pentamethylpiperidine is bonded to each of the two carboxyl groups of sebacic acid via an ester bond. Therefore, this compound is not a benzotriazole-based compound at all, since this compound has no benzotriazole ring.

The product specification for Tinuvin 765 from the manufacturer, Ciba, is attached hereto in the Evidence Appendix. Although the above-mentioned bis-(1,2,2,5,5-pentamethylpiperidinyl)sebacate and each of the benzotriazole-based compounds mentioned at page 22 are all sold under the trade name of “Tinuvin,” Hird et al. does not disclose or suggest the use of a benzotriazole-based compound. The shown molecular structure clearly does not contain a benzotriazole, triazine, or hydroxylamine. Therefore, Hird does not provide the teachings on which the Examiner relies.

Further, Hird et al. discloses at column 10, lines 30 to 32 the following:

“Surprisingly, it has been found that the inclusion of these antioxidants can in some cases promote the biodegradability of the polymers.”

This description clearly shows that the invention of Hird et al. is far from the effect of the present invention which is intended to control the biodegradability of biodegradable plastic (A) by the

use of compounds (B) and (C) in combination to improve the resistance to hydrolysis. In other words, the disclosure of Hird et al. actually teaches away from the combination of Fujihara et al. with Hird et al.

As the Examiner acknowledges, Fujihira contains no disclosure of benzotriazole-, triazine- or hydroxylamine-based compounds, or ultraviolet stabilizers generally. According to the specification of the present invention, one of these compounds in conjunction with the carbodiimide compound improves hydrolysis resistance. See page 5, line 19 to page 6, line 2 of the specification.

With regard to the Examiner's argument to combine Fujihara with either Gagliani or Ohsawa, Fujihara does not suggest a need for another compound in addition to carbodiimide to improve hydrolysis resistance. Paragraph 22 of Fujihira discloses:

It is preferred that the method for improving elastic modulus of the present invention is applied to a biodegradable resin material which contains an additive for suppressing hydrolysis, and, as the additive a carbodiimide compound is preferred.

There is no suggestion or motivation in Fujihira to include an additional compound of any kind to improve hydrolysis resistance. It is also noted that the Examiner believes there is a motivation to incorporate stabilizers from the other references not for improving hydrolysis resistance, but for imparting stability against degradation by ultraviolet rays. The ultraviolet absorbers used in the present application function not only to absorb ultraviolet rays, but when used in conjunction with carbodiimide compounds, have a synergistic effect which provides a greater hydrolysis resistance as well. In other words, ultraviolet absorbers are utilized for two purposes in the present application.

Furthermore, while Ohsawa discloses the use of triazine, it also discloses negative effects of the use of benzotriazole. Triazine is only utilized for the limited purpose of improving the storability of the coating compound. Please see column 10, lines 50-62. Gagliani discloses the use of benzotriazoles, but only for the purpose of protection from color degradation as a result of light and/or heat. Gagliani has no disclosure of improved hydrolysis resistance. Thus, for at least the above reasons, one having ordinary skill in the art *at the time of invention* would not have been motivated to combine these references. The combination of references cited by the Examiner would be, at most, the result of “impermissible hindsight.” According to MPEP § 2143.01, there must be a suggestion in the prior art as to the desirability of the combination in order for prima facie obviousness to be established.

Even if the combination of references cited by the Examiner disclosed the invention as claimed, the references fail to suggest the unexpected results as disclosed in the specification. The Examiner rejects applicants’ assertion of “unexpected results” in the specification. From Tables 1-3 in the specification, it is clear that the addition of an ultraviolet absorber such as those listed in the Markush group of part (C) of claim 1 results in far greater hydrolysis and weather resistance ratios. The data shows that those Examples having an ultraviolet absorber have ratios sometimes in excess of double those without an ultraviolet absorber.

From Table 3 of the present specification, it is understood that a conventional benzophenone-based ultraviolet absorber does not improve the resistance to hydrolysis as compound (C) used in the present invention does, even when used in combination with carbodiimide compound (B). Please see Examples 12 and 13 in comparison with Comparative Example 11. This means that an ultraviolet absorber (stabilizer) in combination with

carbodiimide compound (B) does not always improve the resistance to hydrolysis. Comparative Example 11 is intended to show this fact.

In other words, some of compounds which can be used as compound (C) (specifically, benzotriazole- and triazine-based compounds) have an unexpected function as ultraviolet absorbers (stabilizers). It is noted that conventional ultraviolet absorbers salicylate-, benzophenone- and cyanoacrylate-based compounds and conventional ultraviolet stabilizers metal- or hindered amine-based compounds are not included in compound (C).

Accordingly, it is respectfully submitted that the combination of references fails to teach or suggest the claimed invention. Furthermore, even if the references could have been combined as asserted by the Examiner, the references fail to suggest the unexpected results associated with the claimed invention. Favorable reconsideration of the rejection is earnestly solicited.

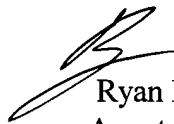
(VIII) CONCLUSION

For at least the foregoing reasons, the Examiner has failed to raise a prima facie rejection of the claims. The Honorable Board is respectfully requested to reverse the rejection of the Examiner.

If this paper is not timely filed, appellants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 50-2866, along with any other additional fees that may be required with respect to this paper.

Respectfully submitted,

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CLAIMS APPENDIX

Claim 1. A biodegradable plastic composition comprising (A) 100 parts by weight of biodegradable plastic, (B) 0.01 to 10 parts by weight of a carbodiimide compound, and (C) 0.01 to 10 parts by weight of at least one compound selected from the group consisting of benzotriazole-, triazine- and hydroxylamine-based compounds.

Claim 2. The biodegradable plastic composition according to claim 1, characterized in that said benzotriazole-based compound is a benzotriazole-based ultraviolet absorber.

Claim 3. The biodegradable plastic composition according to claim 1, characterized in that said triazine-based compound is a triazine-based ultraviolet absorber or triazine derivative having at least one amino group in the molecule.

Claim 4. The biodegradable plastic composition according to claim 1, characterized in that said hydroxylamine-based compound is N-hydroxybenzotriazole or N-hydroxysuccinimide.

Claim 5. The biodegradable plastic composition according to claim 1, characterized in that said biodegradable plastic (A) is an aliphatic-based polyester.

Claim 6. The biodegradable plastic composition according to claim 1, characterized in that said carbodiimide compound (B) is aliphatic polycarbodiimide.

Claim 7. The biodegradable plastic composition according to claim 6, characterized in that said aliphatic polycarbodiimide compound has an isocyanate terminal.

Claim 8. A molded article of a biodegradable plastic obtained by molding the biodegradable plastic composition according to any one of claims 1 to 7.

Claim 9. The molded article of the biodegradable plastic according to claim 8, which is in the form of molded article, extrudate, blow-molded article, thermally molded article, fiber, non-woven fabric, film or sheet.

Claim 10. A method for controlling biodegradation rate of a biodegradable plastic, characterized in that a biodegradable plastic (A) is compounded with a carbodiimide compound (B) and at least one compound (C) selected from the group consisting of benzotriazole-, triazine- and hydroxylamine-based compounds in such a way to adjust its biodegradability.

EVIDENCE APPENDIX

The following pages are provided as evidence of benzotriazole, triazine and hydroxylamine, as well as the product description of Tinuvin 765.



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crystalline acid, synthesized by heating benzil with alcohol and potassium hydroxide; used in organic synthesis. ('ben'zil'ik 'as'ed)

benzimidazole [ORG CHEM] $C_7H_7N_2$ Colorless crystals; melting point 170°C; slightly soluble in water, soluble in ethanol, used in organic synthesis. ('ben'zə'mid'ə,zəl)

benzin See petroleum benzin. ('ben'zən)

benzine See petroleum benzin. ('ben'zən)

benzoate [ORG CHEM] A salt or ester of benzoic acid, formed by replacing the acidic hydrogen of the carboxyl group with a metal or organic radical. ('ben'zə,wat)

benzocaine See ethyl-para-aminobenzoate. ('ben'zə,kæn)

benzodiazepine [MED] A group of tranquilizers that are used to combat anxiety and convulsions. ('ben'zə,dī'az'ə,pən)

benzodihydropyrene [ORG CHEM] $C_{20}H_{12}$ A white to light yellow, oily liquid having a sweet odor; soluble in alcohol, chloroform, and ether; used in perfumery. ('ben'zə-dī'hi'drə'pī,rən)

benzoic acid [ORG CHEM] C_6H_5COOH An aromatic carboxylic acid that melts at 122.4°C, boils at 250°C, and is slightly soluble in water and relatively soluble in alcohol and ether; derivatives are valuable in industry, commerce, and medicine. ('ben'zə'ik 'as'ed)

benzoic anhydride [ORG CHEM] $(C_6H_5CO)_2O$ An acid anhydride that melts at 42°C, boils at 360°C, and crystallizes in colorless prisms; used in synthesis of a variety of organic chemicals, including some dyes. ('ben'zə'ik 'an'hi'drid)

benzoin [MATER] A balsamic resin obtained from trees of the genus *Syrax*; used as an expectorant, as an inhalant in respiratory tract inflammations, and as an antiseptic. Also known as benjamin gum; benzoinam; gum benzoin. [ORG CHEM] $C_{14}H_{12}O_2$ An optically active compound; white or yellowish crystals, melting point 137°C; soluble in acetone, slightly soluble in water; used in organic synthesis. ('ben'zə'wən)

α-benzoin oxime [ORG CHEM] $C_6H_5CH(OH)C(NOH)C_6H_5$ Prisms crystallized from benzene; melting point is 151–152°C; soluble in alcohol and in aqueous ammonium hydroxide solution; used in the detection and determination of copper, molybdenum, and tungsten. ('af'fə 'ben'zə'wən 'ik'səm)

benzol See benzene. ('ben'zəl)

benzol-acetone process [CHEM ENG] A solvent dewaxing process in which a mixture of the solvent and oil containing wax is cooled until the wax solidifies and is then removed by filtration. ('ben'zəl 'as'ə,tən 'prəs'əs)

benzoline See normal benzine. ('ben'zə,lēn)

benzomate [ORG CHEM] $C_{18}H_{16}O_3N$ A white solid that melts at 71.5–73°C; used as a wettable powder as a miticide. ('ben'zə,māt)

benzonitrile [ORG CHEM] C_6H_5CN A colorless liquid with an almond odor; made by heating benzoic acid with lead thiocyanate and used in the synthesis of organic chemicals. Also known as phenyl cyanide. ('ben'zə'nī'trəl)

benzophenone [ORG CHEM] $C_6H_5COC_6H_5$ A diphenyl ketone; boiling point 305.9°C, occurring in four polymorphic forms (α, β, γ, and δ) each with different melting point; used as a constituent of synthetic perfumes and as a chemical intermediate. Also known as diphenyl ketone; phenyl ketone. ('ben'zə'fə'nōn)

benzopyrene [ORG CHEM] $C_{20}H_{12}$ A five-ring aromatic hydrocarbon found in coal tar, in cigarette smoke, and as a product of incomplete combustion; yellow crystals with a melting point of 179°C; soluble in benzene, toluene, and xylene. ('ben'zə'pī,rən)

1,2-benzopyrone See coumarin. ('wən 'tū 'ben'zə'pī,rən)

2,3-benzopyrrole See indole. ('tū 'tū're 'ben'zə'pī,rəl)

5,6-benzoquinoline [ORG CHEM] $C_{13}H_9N$ Crystals which are soluble in dilute acids, alcohol, ether, or benzene; melting point is 93°C; used as a reagent for the determination of cadmium. ('fiv'siks 'ben'zə'kwīn'əl,ēn)

benzoquinone See quinone. ('ben'zə'kwə'nōn)

benzoresorcinol [ORG CHEM] $C_{13}H_{10}O_3$ A compound crystallizing as needles from hot-water solution; used in paints and plastics as an ultraviolet light absorber. Also known as resbenzophenone. ('ben'zə'rī'sor'sə,nəl)

benzosulfimide See saccharin. ('ben'zə'səl'fə,mīd)

benzothiazole [ORG CHEM] C_6H_4SCHN A thiazole fused to a benzene ring; can be made by ring closure from *o*-amino

thiophenols and acid chlorides; derivatives are important industrial products. ('ben'zə'thī'ə,zəl)

4-benzothienyl-N-methylcarbamate [ORG CHEM] $C_{10}H_9NO_2S$ A white powder compound with a melting point of 128°C; used as an insecticide for crop insects. ('fər 'ber'zə'thī'ə,nīl 'kəm'ēth'əl'kār'bə,māt)

benzothiofuran See thianaphthene. ('ben'zə'thī'ə'fūrən)

1,2,3-benzotriazole [ORG CHEM] $C_7H_5N_3$ A compound with melting point 98.5°C; soluble in ethanol, insoluble in water; derivatives are ultraviolet absorbers; used as a chemical intermediate. ('wən 'tū 'tū're 'ben'zə'trī'ə,zəl)

benzotrīchloride [ORG CHEM] $C_6H_5CCl_3$ A colorless to yellow liquid that fumes upon exposure to air; has penetrating odor; insoluble in water, soluble in ethanol and ether; used to make dyes. ('ben'zə'trī'klōr'id)

benzotrīfluoride [ORG CHEM] Colorless liquid, boiling point 102.1°C; used for dyes and pharmaceuticals, as solvent and vulcanizing agent, in insecticides. ('ben'zə'trī'flūr'id)

benzoyl [ORG CHEM] The radical C_6H_5CO found, for example, in benzoyl chloride. ('ben'zə'wəl)

benzoylation [ORG CHEM] Introduction of the aryl radical (C_6H_5CO) into a molecule. ('ben'zə'wəl'ā'shən)

benzoyl chloride [ORG CHEM] C_6H_5COCl Colorless liquid whose vapor induces tears; soluble in ether, decomposes in water; used as an intermediate in chemical synthesis. ('ben'zə'wəl 'klōr'id)

benzoyl chloride 2,4,6-trichlorophenylhydrazone [ORG CHEM] $C_6H_2Cl_3N_2$ A white to yellow solid with a melting point of 96.5–98°C; insoluble in water; used as an anthelmintic for citrus. ('ben'zə'wəl 'klōr'id 'tū 'fər 'sīks 'trī'klōr'ə,fen'əl'hī'drə,zōn)

benzoyl peroxide [ORG CHEM] $(C_6H_5CO)_2O_2$ A white, crystalline solid; melting point 103–105°C; explodes when heated above 105°C; slightly soluble in water, soluble in organic solvents; used as a bleaching and drying agent and a polymerization catalyst. ('ben'zə'wəl pə'rək'sīd)

benzoylpropethyl [ORG CHEM] $C_{18}H_{17}Cl_2NO_2$ An off-white, crystalline compound with a melting point of 72°C; used as a preemergence herbicide for control of wild oats. ('ben'zə'wəl'prə'pē'thəl)

3,4-benzopyrene [ORG CHEM] $C_{20}H_{12}$ A polycyclic hydrocarbon; a chemical carcinogen that will cause skin cancer in many species when applied in low dosage. ('tū're 'fōr 'ben'zə'pī,rən)

benzthiazuron [ORG CHEM] $C_8H_6N_2SO$ A white powder that decomposes at 287°C; slightly soluble in water; used as a preemergent herbicide for sugarbeets and fodder beet crops. ('ben'zə'thī'az'ə'rən)

benzyl [ORG CHEM] The radical $C_6H_5CH_2$ found, for example, in benzyl alcohol, $C_6H_5CH_2OH$. ('ben'zəl)

benzyl acetate [ORG CHEM] $C_6H_5CH_2OOCCH_3$ A colorless liquid with a flowery odor; used in perfumes and flavorings and as a solvent for plastics and resins, inks, and polishes. Also known as phenylmethyl acetate. ('ben'zəl 'as'ə'tāt)

benzylacetone [ORG CHEM] $C_6H_5(CH_2)_2COCH_3$ A liquid with a melting point of 233–234°C; used as an attractant to trap melon flies. ('ben'zəl 'as'ə'tōn)

benzyl alcohol [ORG CHEM] $C_6H_5CH_2OH$ An alcohol that melts at 15.3°C, boils at 205.8°C, and is soluble in water and readily soluble in alcohol and ether; valued for the esters it forms with acetic, benzoic, and sebacic acids and used in soap, perfume, and flavor industries. Also known as phenylmethanol. ('ben'zəl 'al'kə'həl)

benzylamine [ORG CHEM] $C_6H_5CH_2NH_2$ A liquid that is soluble in water, ethanol, and ether; boils at 185°C (770 mmHg) and at 84°C (24 mmHg); it is toxic; used as a chemical intermediate in dye production. Also known as aminotoluene. ('ben'zəl'am,ēn)

benzyl benzoate [ORG CHEM] $C_6H_5COOCH_2C_6H_5$ A oily, colorless liquid ester; used as an antispasmodic drug and as a scabicide. ('ben'zəl 'ben'zə'wāt)

benzyl bromide [ORG CHEM] $C_6H_5CH_2Br$ A toxic, irritating, corrosive clear liquid with a boiling point of 198–199°C; acts as a lacrimator; soluble in alcohol, benzene, and ether; used to make foaming and frothing agents. ('ben'zəl 'brō,mīd)

benzyl chloride [ORG CHEM] $C_6H_5CH_2Cl$ A colorless liquid with a pungent odor produced by the chlorination of toluene. ('ben'zəl 'klōr'id)

benzyl chloroformate [ORG CHEM] $C_6H_5CH_2CO_2$ An oil

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hygrometer

- from cellulose, used for textile finishes and as a thickener for water-base paints. {hī'drāk-sē'th-əl'sel-yə,lōs}
- 2-hydroxyethylhydrazine** [ORG CHEM] $\text{HOCH}_2\text{CH}_2\text{NHNH}_2$ A colorless, slightly viscous liquid with a melting point of -70°C ; soluble in lower alcohols; used as an abscission agent in fruit. Also known as 2-hydrazinoethanol. {hī'drāk-sē'th-əl'hī-drə,zēn}
- 3-hydroxyflavone** See flavanol. {thre hī'drāk-sē'fla,vōn}
- hydroxylite** [PHARM] $\text{C}_{21}\text{H}_{27}\text{ClN}_2\text{O}_2$ A tranquilizer, also possessing antiemetic and antihistaminic effects; used as the hydrochloride salt. {hī'drāk-sə'lēn}
- hydroxyl-** See hydroxy-. {hī'drāk-səl}
- hydroxylamine** [INORG CHEM] NH_2OH A colorless, crystalline compound produced commercially by acid hydrolysis of nitroparaffins, decomposes on heating, melts at 33°C ; used in organic synthesis and as a reducing agent. {hī'drāk-sil-ə,mēn}
- hydroxylamine hydrochloride** [ORG CHEM] $(\text{NH}_2\text{OH})\text{Cl}$ A crystalline substance with a melting point of 151°C ; soluble in glycerol and propylene glycol; used as a reducing agent in photography and in synthetic and analytic chemistry, as an antioxidant in fatty acids and soaps, and as a reagent for enzyme reactivation. {hī'drāk-sil-ə,mēn,hī-drə'klōr,īd}
- ortho-hydroxyaniline** [ORG CHEM] $\text{C}_6\text{H}_4\text{NH}_2\text{OH}$ White crystals that turn brownish upon standing for some time; melts at $172-173^\circ\text{C}$, and will sublime upon more heating; soluble in cold water and benzene; used as a dye for hair and furs, and as a dye intermediate. Also known as *ortho*-aminophenol; oxammonium. {ōr'thō,hī'drāk-səl'an-sī-ən}
- hydroxylapatite** [MINERAL] $\text{Ca}_5(\text{PO}_4)_3\text{OH}$ A rare form of the apatite group that crystallizes in the hexagonal system. {hī'drāk-səl'ap-ə,tī}
- hydroxylase** [BIOCHEM] Any of several enzymes that catalyze certain hydroxylation reactions involving atomic oxygen. {hī'drāk-sə'lās}
- hydroxylation reaction** [ORG CHEM] One of several types of reactions used to introduce one or more hydroxyl groups into organic compounds; an oxidation reaction as opposed to hydrolysis. {hī'drāk-sə'lā-shən,rē,ak'shən}
- hydroxylherderite** [MINERAL] $\text{CaBe}(\text{PO}_4)(\text{OH})$ A monoclinic mineral composed of a phosphate and hydroxide of calcium and beryllium; isomorphous with herderite. {hī'drāk-səl'hər-də,rīt}
- β -hydroxynaphtholic acid** [ORG CHEM] $\text{C}_{10}\text{H}_7\text{OHCOOH}$ A yellow solid that is soluble in ether and alcohol and melts at about 218°C ; used as a dye and a pigment. {bād-ə hī'drāk-sē'naf'thō-ik'as-əd}
- 4-hydroxy-3-nitrobenzenearsonic acid** [ORG CHEM] $\text{HO}_2\text{C}_6\text{H}_3(\text{NO}_2)\text{AsO}(\text{OH})_2$ Crystals used as a reagent for zirconium, also used to control enteric infections and to improve growth and feed efficiency in animals. Also known as roxarsone. {fōr hī'drāk-sē'thrē-nī'trō'bēn,zēn'ār'sān,ik'as-əd}
- hydroxyproline** [BIOCHEM] $\text{C}_5\text{H}_9\text{O}_3\text{N}$ An amino acid that is essentially limited to structural proteins of the collagen type. {hī'drāk-sə'prō,lēn}
- para-hydroxypropiophenone** [PHARM] $\text{HOC}_6\text{H}_4\text{COC}_2\text{H}_5$ A crystalline substance with a melting point of 149°C ; soluble in alcohol and ether; used as an inhibitor of pituitary gonadotropic hormone. {par-ə hī'drāk-sē,prō-pē'ə'fə,nōn}
- 8-hydroxyquinoline** [ORG CHEM] $\text{C}_8\text{H}_7\text{NOH}$ White crystals or powder that darken on exposure to light, slightly soluble in water, soluble in benzene, melting at $73-75^\circ\text{C}$; used in preparing fungicides and in the separation of metals by acting as a precipitating agent. Also known as oxine; oxyquinoline; 8-quinolinol. {āt hī'drāk-sē'kwīn-ə'lān}
- 8-hydroxyquinoline sulfate** [PHARM] $\text{C}_{10}\text{H}_{12}\text{N}_2\text{O}_6\text{S}$ A pale yellow, crystalline powder with a melting point of $175-178^\circ\text{C}$; soluble in water; used as an antiseptic, deodorant, and antiperspirant. {āt hī'drāk-sē'kwīn-ə'lān'səl,fāt}
- 5-hydroxytryptamine** See serotonin. {fiv hī'drāk-sē'trip-tə,mēn}
- 5-hydroxytryptophan** [BIOCHEM] $\text{C}_{11}\text{H}_{12}\text{N}_2\text{O}_3$ Minute rods or needlelike crystals; the biological precursor of serotonin. {fiv hī'drāk-sē'trip-tə,fan}
- 3-hydroxytyramine hydrobromide** [ORG CHEM] $(\text{HO})_2\text{C}_6\text{H}_3\text{CH}_2\text{CH}_2\text{NH}_2\cdot\text{HBr}$ A source of dopamine for the synthesis of catecholamine analogs. {thre hī'drāk-sē'tī-rə,mēn,hī-drə'b'rō,mīd}
- hydroxyurea** [PHARM] HONHCONH_2 Needlelike crystals with a melting point of $133-136^\circ\text{C}$; used as an antineoplastic agent. Also known as hydroxycarbamide. {hī'drāk-sē-yū'rē-ə}
- hydrozincite** [MINERAL] $\text{Zn}_3(\text{OH})_2(\text{CO}_3)_2$ A white, grayish, or yellowish mineral composed of basic zinc carbonate, occurring as masses or crusts. {hī-drə'zīn,ī't}
- Hydrozoa** [INV ZOO] A class of the phylum Cnidaria which includes the fresh-water hydras, the marine hydroids, many small jellyfish, a few corals, and the Portuguese man-of-war. {hī-drə'zō-ə}
- Hydrus** [ASTRON] A southern constellation, right ascension 2 hours, declination 75°S . Also known as Water Snake. {hī'drəs}
- hyaena** [VEKT ZOO] An African carnivore represented by three species of the family Hyacnidae that resemble dogs but are more closely related to cats. {hī'ē-nə}
- Hyeniales** [PALBOT] An order of Devonian plants characterized by small, dichotomously forked leaves borne in whorls. {hī'ē-nī'lēz}
- Hyeniales** See Hyeniopsida. {hī'ē-nī-ə'le}
- Hyenlopsida** [PALBOT] An extinct class of the division Equisetophyta. {hī'ē-nē'ap-sə-də}
- hyetal coefficient** See pluviometric coefficient. {hī'ē-təl'kō-fish-ēnt}
- hyetal equator** [CLIMATOL] A line (or transition zone) which encircles the earth (north of the geographic equator) and lies between two belts that typify the annual time distribution of rainfall in the lower latitudes of each hemisphere; a form of meteorological equator. {hī'ē-təl'ēkwə-tōr}
- hyetal region** [CLIMATOL] A region in which the amount and seasonal variation of rainfall are of a given type. {hī'ē-təl'ē-jən}
- hyetograph** [CLIMATOL] A map or chart displaying the diurnal or areal distribution of precipitation. {hī'ē-tə'grəf}
- hyetography** [CLIMATOL] The study of the annual, seasonal, and geographic distribution of precipitation. {hī'ē-tə'grə-fē}
- hyetology** [METEOROL] The science which treats of the origin, structure, and various other features of clouds and precipitation. {hī'ē-təl-ə-jē}
- Hygiea** [ASTRON] The fourth largest asteroid, with a diameter of about 260 miles (419 kilometers), mean distance from sun of 3.14 astronomical units, and C-type surface. {hī'jē-ə}
- hygiene** [MED] The science that deals with the maintenance and practices of good health. {hī'jēn}
- hygristor** [ELECTR] A resistor whose resistance varies with humidity; used in some types of recording. {hī'grīst-ər}
- Hygroblidae** [INV ZOO] The squeaker beetle, a suborder of coleopteran insects in the suborder Polyphaga. {grō'bī-ə'īd-ē}
- hygrodeik** [ENG] A form of psychrometer with dry-bulb thermometers mounted on opposite sides of a specially designed graph of the psychrometric equation, so that the intersections of two curves determined by the wet-bulb and dry-bulb readings yield the relative humidity and absolute humidity. {hī'grə-dīk}
- hyrogram** [ENG] The record made by a hygrograph. {hī'grə-gram}
- hygrograph** [ENG] A recording hygrometer. {hī'grə-graf}
- hygrokinematics** [METEOROL] The description of the motion of water substances in the atmosphere. {hī'grə-kīn-ə'mat-iks}
- hygrology** [METEOROL] The study of the amount and water vapor content (humidity) of the atmosphere. {hī'grə-lō-jē}
- hygroma** [MED] A congenital disorder in which a fluid-filled cystic cavity is formed from the epidermis. {hī'grō-mə}
- hygrometer** [ENG] An instrument for measuring the amount of moisture in the atmosphere, the indication usually being in terms of relative humidity, a percentage which the moisture present bears to the amount of moisture that could be present in the atmosphere without condensation taking place.



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- Any of three isomeric compounds, C₃H₃N₃, each having three carbon and three nitrogen atoms in a six-membered ring.
- A compound derived from one of these isomers.

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